



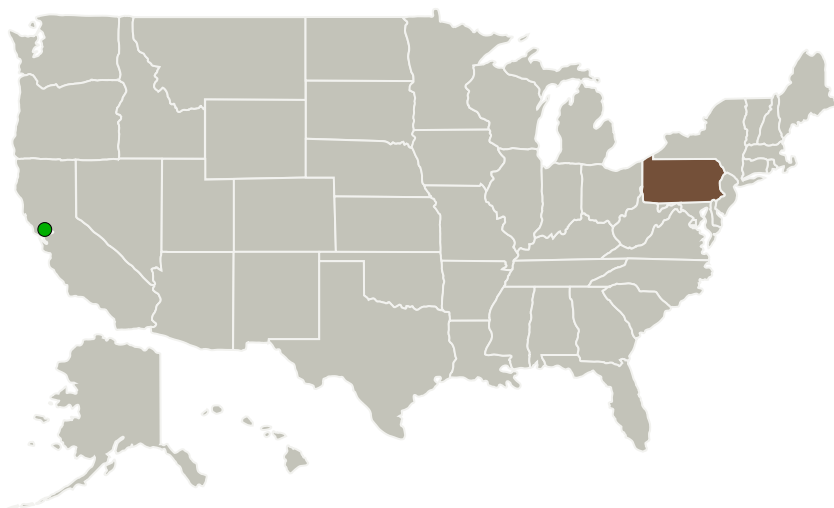
Project Introduction

Existing methods of state estimation and route determination of planetary rovers are too expensive, both in computational time and power requirements. Many sensors and methods that are used in terrestrial systems are too large, too heavy, or too power hungry for space. Current optical methods used in rovers are slow due to limited computational power. As a result, they are limited in their speed and performance. Small, high-cadence, minimalist rovers are poised to break new ground by expanding space exploration capabilities. They can be used as scouts or fetch samples as proposed by the future Mars Sample Return mission. The ability to quickly and efficiently estimate state becomes even more crucial as the size, weight, and power budgets continue to shrink. This research proposes to research and develop methods for low-latency and inexpensive state estimation and route determination. It will pursue this by investigating minimalist sensor configurations that provide high-fidelity measurements for state estimation and focus on computationally efficient visual odometry. The result of this research will enable safer, faster, and smarter navigation of a planetary rover.

Anticipated Benefits

The result of this research will enable safer, faster, and smarter navigation of a planetary rover.

Primary U.S. Work Locations and Key Partners



Innovations for Fast, Accurate,
Robust Planetary Rover
Navigation

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Innovations for Fast, Accurate, Robust Planetary Rover Navigation



Completed Technology Project (2016 - 2019)

Organizations Performing Work	Role	Type	Location
Carnegie Mellon University	Lead Organization	Academia	Pittsburgh, Pennsylvania
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

Pennsylvania

Project Website:

<https://www.nasa.gov/strg#.VQb6T0jJzyE>

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Carnegie Mellon University

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

William Whittaker

Co-Investigator:

Eugene W Fang



Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.1 Sensing and Perception
 - └ TX04.1.2 State Estimation

Target Destinations

The Sun, The Moon, Outside the Solar System